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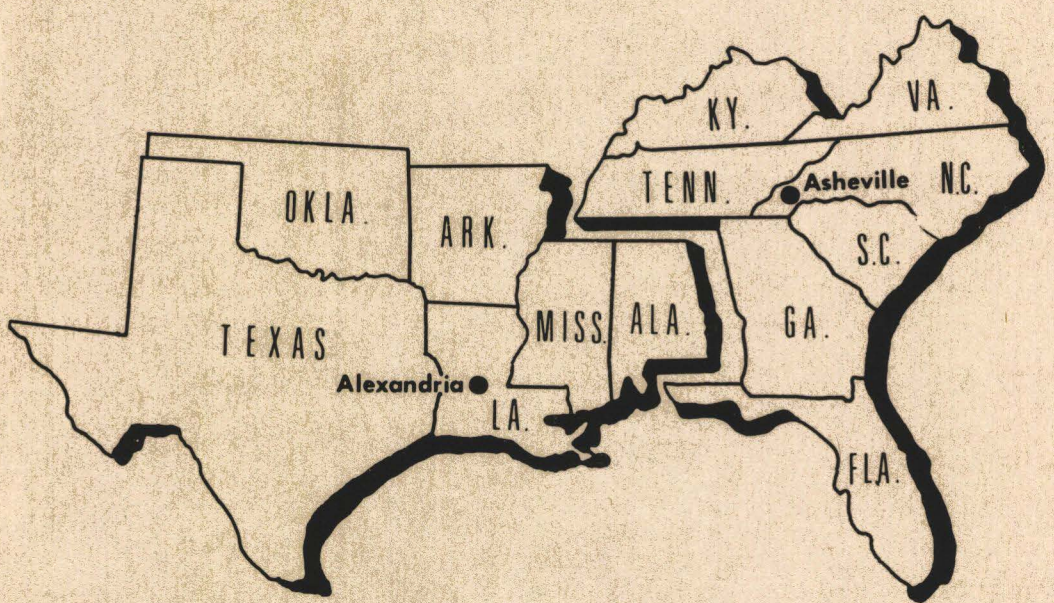
U.S. Forest Service
Asheville, North Carolina



U.S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE
SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
DIVISION OF FOREST PEST CONTROL

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A COOPERATIVE OAK WILT TREND SURVEY IN GREENE AND WASHINGTON COUNTIES, TENNESSEE - 1969

By

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U. S. Forest Service
Asheville, North Carolina

ABSTRACT

The results of an oak wilt, *Ceratocystis fagacearum* survey conducted in Greene and Washington Counties, Tennessee in July 1969 revealed a continued low incidence of the disease. Six positive cultured trees (two in Greene County and four in Washington) were detected from a 20 percent aerial and ground survey coverage. The survey covered an area of 371,200 acres in Greene County and 180,480 acres in Washington County. No further surveys are recommended for the next five years.

INTRODUCTION

Oak wilt, caused by the fungus *Ceratocystis fagacearum* (Bretz) Hunt, infects at least 50 species of oaks. The disease was first discovered and reported as a fungus disease in Wisconsin in 1942 (Henry, 1944). Since then, oak wilt has been detected in a 21 state area in the central and eastern U.S.

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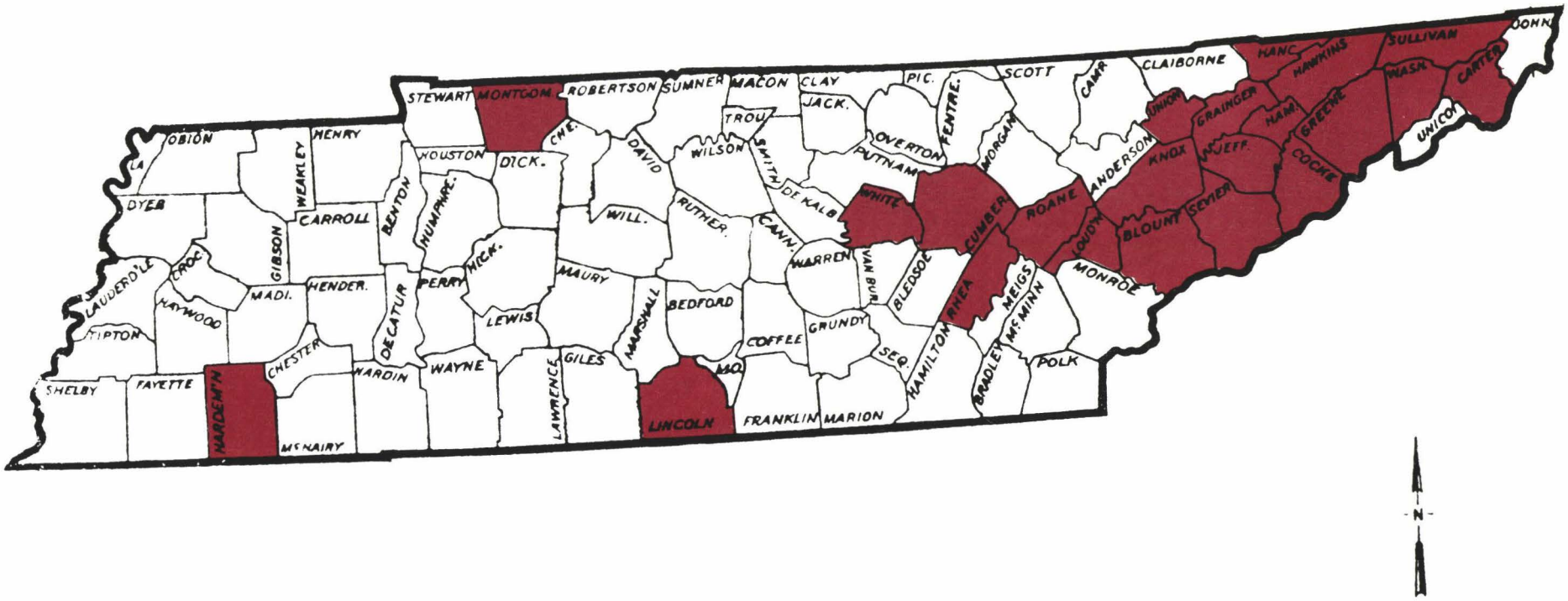
Oak wilt was first detected in Tennessee in 1951. At present, the disease has been found in 22 Tennessee counties, primarily in the eastern part of the state (Fig. 1). The results of a statewide survey conducted by the Division of Forest Pest Control and the Tennessee Division of Forestry in 1964 revealed a low incidence of oak wilt in the state. Eighteen infection centers were found in ten counties, primarily in eastern Tennessee. However, one infection center was found in each of three widely separated central and western Tennessee counties, indicating the possibility of limited oak wilt activity in widely scattered areas of the state (Astin and Quillin, 1965). A cooperative oak wilt trend survey conducted by the Tennessee Division of Forestry and the Division of Forest Pest Control in 1967 also revealed a low incidence in ten eastern Tennessee counties (Dean, *et al.*, 1967).

Previous oak wilt studies indicate the earliest infection in the state probably occurred in Greene County about 1945 or 1946 (Hepting, 1966). The Southeastern Forest Experiment Station conducted intensive studies concerning the rate and methods of oak wilt spread in Greene and Washington Counties, Tennessee between 1951 and 1961 (Stegall, 1962). This project was designed primarily to test the effectiveness of possible control measures for the disease. All oak wilt trees in Greene County were treated by the so-called "Tennessee and North Carolina oak wilt control method", between 1955 and 1961, which consisted of felling all diseased trees, bucking up the logs, spraying all woody material down to four inches in diameter with a BHC - DDT - Pentachlor solution and treating the stumps with ammate crystals. No treatment was applied in adjoining Washington County. This project was transferred to the Division of Forest Pest Control in 1962. The results of oak wilt surveys and control studies conducted in the two counties between 1951 and 1963 are shown in Table 1. Results obtained from the final intensive survey coverage in 1963 revealed a low incidence of oak wilt in both counties with little change in the disease rate of spread during the period 1958 - 63 in either county (Cordell, *et al.*, 1963). This reflects the ineffectiveness of the tested control method and represents the primary reason for terminating the study in 1963.

The objective of the 1969 survey was to compare the results obtained with previous survey results to determine the present trend of oak wilt infection in the two counties. Greene and Washington Counties represent the earliest known and most intensively surveyed oak wilt affected areas in the southeast (Fig. 2).



Counties with minimum of one oak wilt infection.

Scale - statute miles

0 25 50

FIG. 1. DISTRIBUTION OF OAK WILT IN TENNESSEE - 1969

Table 1. Summary of oak wilt surveys in Greene and Washington Counties, Tennessee, 1951-1963

Year	Old known centers examined		Newly found infection centers		Total active Centers	Degree of Coverage	Method of Survey	Centers treated
	Total Number	Active Percent	Previous infection Number	Initial infection Number	Number	Percent		Percent
GREENE COUNTY								
1951	-	-	3	1	4	10	Roadside	-
1952	4	25	1	0	2	10	Roadside	-
1953	5	20	2	3	6	60	Aerial	-
1954	10	60	7	7	20	100	Aerial	-
1955	48	25	11	8	31	75	Aerial-roadside	100
1956	51	24	23	2	37	100	Aerial-roadside	65
1957	61	23	29	6	49	100	Aerial-roadside	95
1958	118	26	24	27	82	100	Aerial-roadside	98
1959	169	18	12	22	64	100	Aerial-roadside	99
1960	171	17	7	21	58	100	Aerial-roadside	91
1961	237	16	11	25	73	100	Aerial-roadside	92
1962	223	12	2	26	55	100	Aerial-roadside	0
1963	172	17	2	23	55	100	Aerial-roadside	-
WASHINGTON COUNTY								
1951	-	-	1	0	1	10	Roadside	-
1952	1	-	2	0	2	10	Roadside	-
1953	3	-	5	6	11	60	Aerial	-
1954	14	21	11	3	17	100	Aerial-roadside	-
1955	25	32	11	1	20	-	Limited roadside	-
1956	38	13	5	0	10	-	Limited roadside	-
1957	-	-	-	-	-	0	None	0
1958	45	16	34	41	82	100	Aerial-roadside	0
1959	120	17	21	11	51	100	Aerial-roadside	0
1960	137	27	17	24	78	100	Aerial-roadside	0
1961	197	18	11	23	70	100	Aerial-roadside	0
1962	175	15	6	19	52	100	Aerial-roadside	0
1963	169	23	2	16	57	100	Aerial-roadside	0

Total area surveyed is 580 square miles in Greene County and 282 square miles in Washington County.

1963 OAK WILT SURVEY

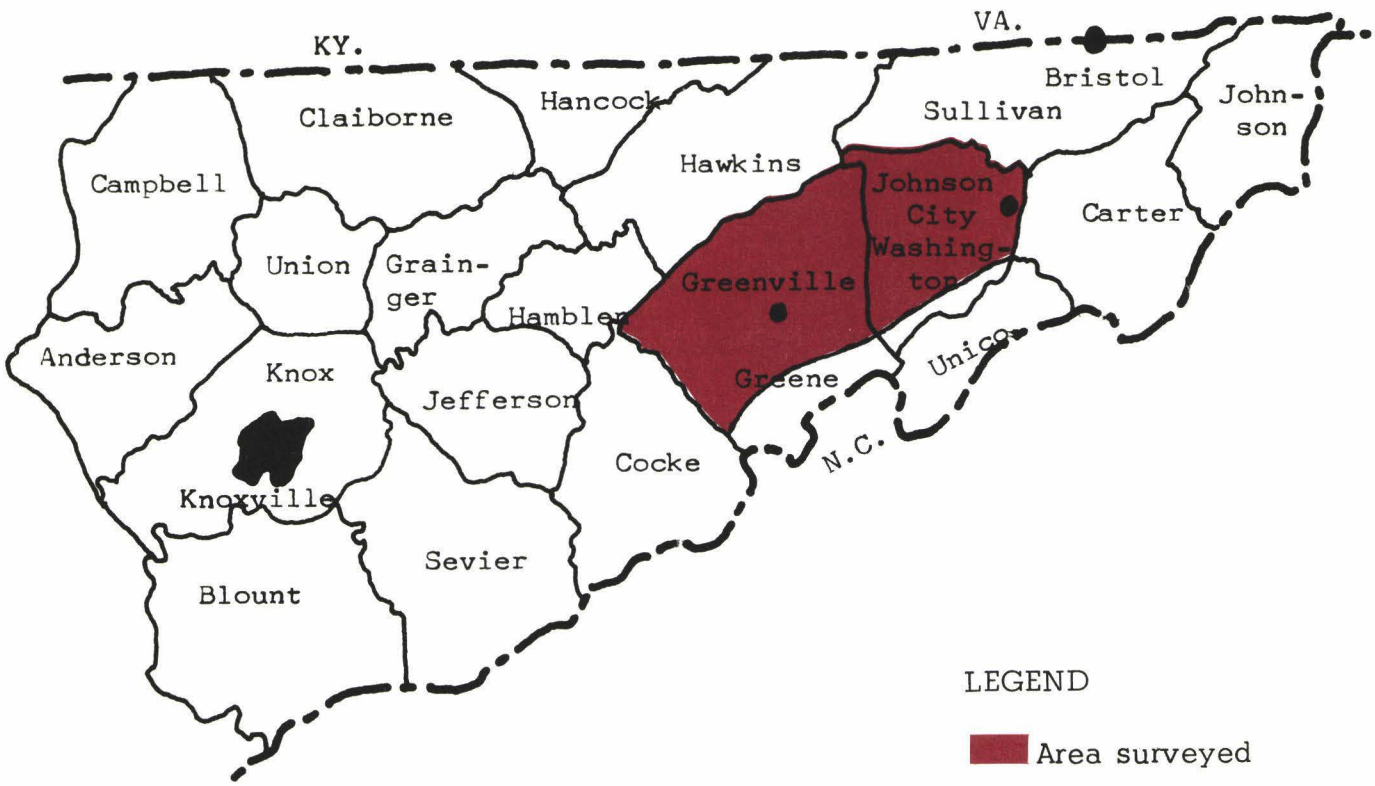


Fig. 2. Oak wilt trend survey in Greene and Washington Counties, Tennessee - 1969.

METHODS

A 20 percent aerial survey was conducted in the two counties on July 2, 1969. The flying was accomplished using a Cessna 182 aircraft at altitudes between 500 and 1,000 feet above the prevailing terrain and at an average air speed of 90 to 100 miles per hour. The flight crew consisted of the pilot, tracker (navigator), one observer from the Division of Forest Pest Control and one from the Tennessee Division of Forestry. Flight lines were flown five miles apart in a north-south (long axis of each county) direction. This system provided each observer a one-half mile wide survey strip on each side of the airplane. All aerial oak wilt suspects were plotted on TVA 15 minute topographic quadrangle maps. The gross survey area involved 580 square miles (371,200 acres) in Greene County and 272 square miles (180,480 acres) in Washington County.

All oak wilt aerial suspects were ground checked July 7-11, by the Tennessee Division of Forestry Insect and Disease Specialist and Service Foresters with the assistance of the Division of Forest Pest Control Pathologist. Several six-to-eight inch long branch samples were obtained from at least one tree displaying oak wilt symptoms per infection center. The samples were cultured on oak wilt identification agar 1/ in the laboratory to isolate and identify *C. fagacearum* . The identification of *C. fagacearum* in culture is well described by True, *et al*. (1960). All sample material was maintained under refrigeration in the field until cultured in the laboratory.

RESULTS

The results of this survey was summarized in Table 2. The aerial survey revealed 33 suspected oak wilt trees in 32 infection centers. Subsequent ground checks disclosed that eight trees at seven centers expressed oak wilt type symptoms. *C. fagacearum* was isolated from six trees sampled in six infection centers; four in Washington County and two in Greene County. Three of these trees were southern red oaks, *Quercus falcata* Michx., and three were black oaks, *Q. velutina* Lam. Three of the infection centers were previously known old centers while the remaining four were new infections.

1/ Difco Laboratories culture media.

Table 2 . Results of oak wilt survey in Greene and Washington Counties, Tennessee - 1969.

County	Oak Wilt Suspect Trees		No. *C. fagacearum* infected trees 1/
	Detected By Air	Sampled	
GREENE		3	2
WASHINGTON		5	4
TOTAL		8	6

DISCUSSION

The results of this survey indicate that the incidence of oak wilt in Greene and Washington Counties, Tennessee, remains at a low level with little change in infection intensity since 1958 (Table 1). The oak wilt PCA (Post Control Appraisal) studies were established in these two counties in 1958 by the Southeastern Forest Experiment Station to evaluate the effectiveness of control measures for the disease. This study was terminated along with the other oak wilt studies in 1963. A recent analysis of the five year results obtained from the PCA study showed no significant difference in the rate of disease spread between the controlled and untreated counties (Jones, 1965) .

A direct comparison cannot be made between this year's survey results and results obtained from more intensive surveys conducted in previous years. However, it is interesting to compare this year's observations with previous survey results. In 1963, the final year of intensive oak wilt survey work in Greene and Washington Counties, 55 and 57 infection centers were found in the two counties, respectively. These results were obtained from two 100 percent aerial survey coverages conducted in June and August, 1963 along with supplemental ground observations conducted throughout the summer. On an area basis, this represents 9.5 and 20.2 infection centers per 100 square miles in Greene and Washington Counties, respectively. The results obtained from the single 20 percent aerial survey coverage and subsequent ground observations in July, 1969 represents 20 (3.4 per 100 square miles) and 40 (14.3 per 100 square miles) infection

1/ Determined by Laboratory diagnosis.

centers in Greene and Washington Counties, respectively. These figures were obtained by multiplying the single 20 percent survey results by ten (five times for intensity and two times for survey coverage) for equal comparison with the two 100 percent aerial surveys conducted in 1963.

These results indicate an even lower incidence of oak wilt in the two counties than indicated in previous years. This is especially significant when considering that oak wilt has probably been present in this area for nearly 25 years (since 1945 or 46) and that no control work has been conducted in either county since 1961. However, as previously stated, a valid comparison between the 1969 and previous survey results cannot be made as a result of the inconsistency in intensity of survey coverage in 1969.

At any rate, the annual incidence of oak wilt remains at less than one-tenth of one percent when considering the 50.7 million cubic feet of oak sawtimber reported in the two counties (Southern Forest Experiment Station - Forest Statistics for Tennessee Counties, 1962) . Similar oak wilt infection trends have also been obtained in other areas in the Southern Appalachians.

RECOMMENDATIONS

1. Since the incidence of oak wilt remains low in Greene and Washington Counties, no additional surveys should be needed in the near future. A similar survey should be conducted in the two counties in late June or early July, 1974.

2. No control work is recommended for forest stands. Any oak wilt infection detected in high value areas (shade, ornamental, recreation, etc.) may be treated by complete destruction of the infected tree (i. e. removal from site and burning) along with either excavation of the remaining stump or treatment of exposed stump surface and frilled buttress roots with ammate crystals.

3. Oak wilt surveillance should be maintained during the early spring and summer months (June - September) by the Tennessee Division of Forestry Foresters and other field personnel, especially in and around counties where the disease has been previously found (Fig. 1.) Any suspect trees should be promptly reported to the Forest Insect and Disease Specialist in Knoxville, Tennessee.

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More detailed information can be obtained by writing to the Forest Pest Control Division Field Offices listed below or to the Atlanta Office.

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